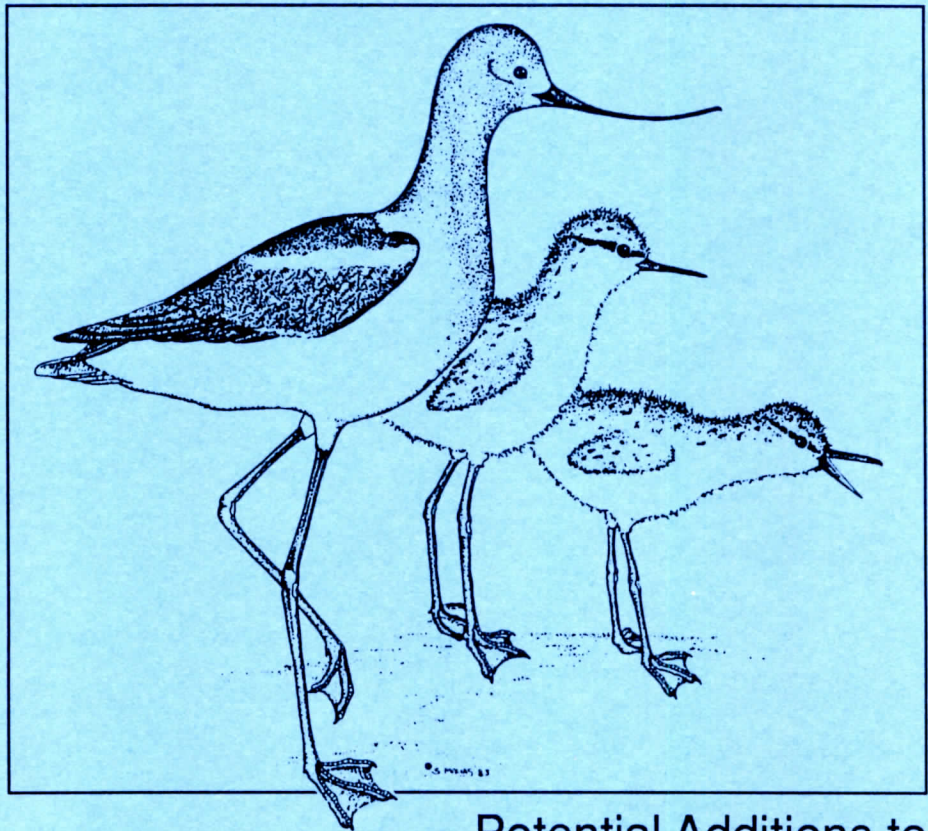


FINAL ENVIRONMENTAL ASSESSMENT



Potential Additions to
San Francisco Bay National Wildlife Refuge
Alameda, San Mateo, and
Santa Clara Counties, California

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
Region 1, Portland, Oregon

FINDING OF NO SIGNIFICANT IMPACT

POTENTIAL ADDITIONS TO
SAN FRANCISCO BAY NATIONAL WILDLIFE REFUGE
Alameda, San Mateo, and Santa Clara Counties, California

The U.S. Fish and Wildlife Service (Service) has prepared an environmental assessment for potential additions to San Francisco Bay National Wildlife Refuge (refuge) to evaluate the effects associated with the land acquisition needed to protect, and where necessary, restore, enhance, and manage wetlands, uplands, and deep water habitats for many species of fish, wildlife, and plants. Such action will provide opportunities for increased public use and enjoyment of this nation's natural resources.

Proposed Action:

The Service proposes to acquire up to 20,000 acres of lands, marshes, tidal flats, salt ponds, submerged lands, and open waters in the south San Francisco Bay area to add to the existing refuge as authorized and funded by Congress. A combination of fee title, conservation easement, lease, and cooperative agreement acquisition would be used to protect the habitat. The area encompassing the potential additions is located in and around south San Francisco Bay, in Alameda, San Mateo, and Santa Clara Counties, extending from a few miles north of the San Mateo Bridge to the extreme south end of the bay. The reason for proposing to expand the refuge by approximately 20,000 acres is to enhance the purposes for which the refuge was originally established. These purposes as stated in Public Law 92-330 are:

1. For the preservation and enhancement of highly significant wildlife habitat.
2. For the protection of migratory waterfowl and other wildlife, including species known to be threatened with extinction.
3. To provide an opportunity for wildlife-oriented recreation and nature study within the open space so preserved.

Authority to undertake such an action is provided the Service by Public Law 100-556 dated October 28, 1988; the Endangered Species Act of 1973 (16 U.S. Code 1531-1543; 87 Statute 884) as amended; and the Emergency Wetland Resources Act of 1986 (Public Law 99-645) using monies made available through the Land and Water Conservation Fund Act of 1965 (U.S. Code 46010-4-4601-11; 78 Statute 897). Further authority is provided by the Migratory Bird Conservation Act of 1929 (U.S. Code 715-715d, 715e, 715f-715r; 45 Statute 1222) as amended using monies made available through the Migratory Bird Hunting and Conservation Stamp Act of 1934 (U.S. Code 7128-718h; 48 Statute 452) as amended; and the Fish and Wildlife Act of 1956 (U.S. Code 742a-742j; 70 Statute 1119) as amended.

Alternatives to the proposed action that were considered and dismissed included (1) No Action; (2) Total Fee Title Acquisition; (3) Conservation Easement Acquisition; (4) Acquisition/Management by Others; (5) Zoning; and (6) Acquisition Priority Groups. For further details regarding alternatives that were considered and dismissed see pages 17-20 of the environmental assessment.

The following describes why the proposed action will not have a significant effect on the human environment:

1. The natural processes under which much of the area has evolved will be permitted to continue, and some of the area's wildlife habitat values will be restored and/or enhanced.
2. The proposal is consistent with most of the general plan designations in the affected cities and counties (pages 30-36 in the environmental assessment).
3. Mitigation for removing lands from private ownership and placing them into public ownership will be accomplished by compensating current owners the appraised fair market value for their properties. Monies paid annually to the affected counties via the Refuge Revenue Sharing Act will help offset the loss of revenues from property taxes on lands acquired in fee title.
4. Impacts to the local economy will not be significant because 1) the Service's acquisition plans do not prohibit environmentally sound development which conforms to local plans, 2) the Service's acquisition plans would have only an indirect effect on the economy over time, and 3) the affected counties and cities have the authority to ultimately control growth within the south bay area.
5. The action would not have an adverse impact on threatened or endangered species or other natural flora or fauna.
6. An archaeological records search revealed that the area is rich in archaeological and ethnographic sites and historic landmarks. Before implementation of any management activities which may affect or damage these sites, the Service would ensure that necessary steps are taken to protect these sites.
7. The Service has evaluated the proposal with respect to various rules, regulations, and legislation, and has found it to be in conformance to: Executive Orders 12372 (Intergovernmental Review of Federal Programs), 12630 (Government Actions and Interference with Constitutionally Protected Property Rights), 11990 (Protection of Wetlands), 11988 (Floodplain Management), and 11593 (Protection of Historical, Archaeological, and Scientific Properties); the Endangered Species Act of 1973; the Emergency Wetlands Resources Act of 1986; the North American Wetlands Conservation Act of 1990; Secretarial Order 3127 (regarding contaminants); the Coastal Zone Management Act (Public Law 92-583); and the Uniform Relocation Assistance and Real Property Acquisition Policies Act (Public Law 91-646).

8. This proposal is comparable to and has been preceded by similar actions taken by the Service whereby lands are acquired for and made part of the National Wildlife Refuge System.

Related Documents:

A Final Environmental Statement, Acquisition of San Francisco Bay National Wildlife Refuge, California (FES 77-23) was completed in 1977 for acquisition of lands for the original refuge which was established in accordance with Public Law 92-330 of June 30, 1972. The project supports the following related documents: Concept Plan for Waterfowl Habitat Protection, San Francisco Bay, California; North American Waterfowl Management Plan; National Wetlands Priority Conservation Plan; Fishery Resources Program Statement of Responsibilities and Role; Salt Marsh Harvest Mouse & California Clapper Rail Recovery Plan; California Least Tern Recovery Plan; Peregrine Falcon Recovery Plan; Management Guidelines for the Western Snowy Plover; Nongame Bird Strategies; and FISHERIES - USA, Recreational Fisheries Policy of the U.S. Department of the Interior, Fish and Wildlife Service. Any lands acquired would be managed as part of the National Wildlife Refuge System as outlined in the environmental impact statement entitled Operation of the National Wildlife Refuge System (FES 76-59).

Public Availability:

The draft environmental assessment was distributed for a 30-day public review and comment period to Federal and State congressional delegations; Federal, State, and local agencies; public libraries; landowners; and private groups and individuals. Copies of the final environmental assessment and "Finding of No Significant Impact" will be distributed to those that received the draft assessment and any others who have requested copies. Additional copies are available upon request from:

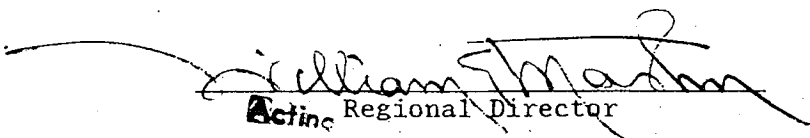
U.S. Fish and Wildlife Service (ARW-RE)
1002 N.E. Holladay Street
Portland, Oregon 97232

Phone: (503) 231-2232

Determination:

Based upon information contained in the environmental assessment, as well as numerous and similar acquisitions that have preceded this action, the Service has determined that this action would not constitute "a major Federal action significantly affecting the quality of the human environment." This "Finding of No Significant Impact" is being made available for public review for 30 days before any action is undertaken.

Issued in Portland, Oregon, March 5, 1990.


Acting Regional Director

ENVIRONMENTAL ASSESSMENT

POTENTIAL ADDITIONS TO

SAN FRANCISCO BAY NATIONAL WILDLIFE REFUGE

ALAMEDA, SAN MATEO, AND SANTA CLARA COUNTIES, CALIFORNIA

PREPARED BY

U.S. DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

REGION 1, PORTLAND, OREGON

MARCH 1990

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PREAMBLE

Because of the great loss of wetlands that has already occurred, not only in the San Francisco Bay area but also across most of North America, the U.S. Fish and Wildlife Service (Service) must act to protect, enhance, restore, and manage as many of the remaining wetlands as practicable. Such action will provide opportunities for increased public use and enjoyment of this nation's natural resources.

INTRODUCTION

Before the arrival of Europeans in the mid-1800's, San Francisco Bay was surrounded by approximately 860 square miles of marshes and hundreds of square miles of mudflats which provided excellent habitat for waterfowl, shorebirds, and many other species of wildlife. Since that time, man's activities have caused major changes in San Francisco Bay and the Sacramento-San Joaquin Delta. Diking and filling were done to make marshes and mudflats available for urban development, agricultural use, and construction of salt ponds. Water was diverted from the Sacramento River for agricultural, residential, and industrial use. Hydraulic gold mining in the Sierra Nevada Mountain Range caused siltation in the bay. As the human population in the area increased, waste disposal into the bay increased. Over the years these activities have caused extensive losses of wildlife habitat, degradation of water quality, reduction of natural flushing, and accelerated sedimentation in the bay. The total area of the bay has been reduced by 37 percent from what it was in the mid-1800's (American Association for the Advancement of Science, 1982).

On June 30, 1972, Congress passed Public Law 92-330 (Appendix A), which authorized formation of the San Francisco Bay National Wildlife Refuge (refuge) "... for the preservation and protection of critical habitat and associated wildlife, including species known to be threatened with extinction, and to provide opportunity for wildlife oriented recreation and nature study in the open space preserved." This legislation stated that "... the total area within the boundaries shall not exceed twenty-three thousand acres of land, marshes, tidal flats, salt ponds, submerged lands, and open waters." In 1977 the Service prepared a FINAL ENVIRONMENTAL STATEMENT, ACQUISITION OF LANDS FOR THE SAN FRANCISCO BAY NATIONAL WILDLIFE REFUGE, CALIFORNIA, hereafter referred to as FES 77-23. Since much of the material in the 1977 environmental statement is still applicable, it complements and supplements this 1990 environmental assessment. FES 77-23 is available for review at the San Francisco Bay National Wildlife Refuge headquarters in Fremont, California, and at the Service's regional office in Portland, Oregon. To date, the Service has acquired or otherwise controls 18,219 acres of refuge lands in south San Francisco Bay within an approved 23,000-acre refuge boundary.

In March 1988, California Congressman Don Edwards introduced legislation (H.R. 4272) in an effort to enlarge the refuge. On October 28, 1988, Congress passed Public Law 100-556 (Appendix B), which increased the Service's acquisition authority from 23,000 acres to a total of 43,000 acres. Congress also provided \$3.75 million for acquisition in Fiscal Year 1990.

The Service has the legal responsibility for the welfare of migratory birds, anadromous fish, and endangered animals and plants occurring in the United States. In addition to the special legislation for this refuge, the Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j), as amended, authorizes the acquisition of wildlife refuge lands. The Endangered Species Act of 1973 (16 U.S.C. 1531-1543), as amended, provides authority for the Service to acquire lands for the protection and preservation of endangered species. The Emergency Wetlands Resources Act of 1986 (16 U.S.C. 1901-1902) provides authority for the Secretary of the Interior to acquire wetlands. Funding for acquisition projects authorized by these three acts comes from the Land and Water Conservation Fund. This fund is derived from receipts from offshore oil and gas leases, taxes on boat gasoline, and the sale of surplus Federal property. Funding for acquisition of land at San Francisco Bay National Wildlife Refuge by the Service will most likely come from this source.

Because of the nature of the 1988 legislation, any interests acquired under the authorized expansion is flexible and dependent on many factors. The boundaries, and thus the lands now desired for acquisition for wildlife habitat, is not firmly established as is often the case in other acquisition projects. Hence, Congress has given the Service discretion as to which parcels it may acquire. Obviously, the acquisition of some parcels may be more desirable and thus, may be more actively pursued than others.

Until lands are acquired, they do not become a part of the refuge. Lands identified herein as possible for acquisition may or may not be acquired depending on price, state of development or proposed development, character modification, opportunities to protect through other mechanisms, and other considerations. This environmental assessment is not intended to be used to influence general plan, zoning, or other land use determinations by State and local government.

Through its planning process, including and incorporating other studies done by the Service and other entities, the Service has identified tracts of land which are suitable for inclusion in the San Francisco Bay National Wildlife Refuge. These "potential additions," which are the topic of this assessment, are located in and around south San Francisco Bay, in Alameda, San Mateo, and Santa Clara Counties, extending from a few miles north of the San Mateo Bridge to the extreme south end of the bay. Locations of individual tracts being considered for addition to the refuge are delineated on the enclosed map. The term "potential additions" is further explained in Section II. A., Proposed Action and Alternatives.

This environmental assessment addresses issues regarding the 1988 legislation. Some of the data provided in this assessment is not required by the National Environmental Policy Act, but is included for planning purposes. Issues regarding management of refuges in the National Wildlife Refuge System are addressed in the Service's environmental impact statement entitled OPERATION OF THE NATIONAL WILDLIFE REFUGE SYSTEM, which was published in 1976 and is currently being updated. The 1976 document

is available for review at the same locations identified on page 1 for FES 77-23.

I. PURPOSE OF AND NEED FOR ACTION

The reason for proposing to expand the refuge by approximately 20,000 acres is to enhance the purposes for which the refuge was originally established. These purposes as stated in Public Law 92-330 are:

1. For the preservation and enhancement of highly significant wildlife habitat.
2. For the protection of migratory waterfowl and other wildlife, including species known to be threatened with extinction.
3. To provide an opportunity for wildlife-oriented recreation and nature study within the open space so preserved.

The proposed action is needed to preserve, enhance, or restore essential environments (or habitats) for wildlife and to provide for the enjoyment of wildlands and wildlife by the public.

The San Francisco Bay National Wildlife Refuge is part of a nationwide system of Federal refuges that is operated in accordance with the overall mission of the National Wildlife Refuge System. This mission is to provide, preserve, restore, and manage a national network of lands and waters sufficient in size, diversity, and location to meet society's needs for areas where the widest possible spectrum of benefits associated with wildlife and wildlands is enhanced and made available.

The following broad goals of the National Wildlife Refuge System describe a level of responsibility and concern for the nation's wildlife resources for the ultimate benefit of people.

1. To preserve, restore, and enhance in their natural ecosystems all species of animals and plants that are endangered or threatened with becoming endangered.
2. To perpetuate the migratory bird resource.
3. To preserve a natural diversity and abundance of fauna and flora on refuge lands.
4. To provide an understanding and appreciation of fish and wildlife ecology and man's role in the environment, and to provide refuge visitors with high quality, safe, wholesome, and enjoyable recreational experiences oriented toward wildlife to the extent these activities are compatible with the purposes for which the refuge was established.

The proposal would also help accomplish one of the Administration's goals of ensuring that there is no net loss of wetlands in the United States.

It should be emphasized that wetlands are a valuable resource to society as a whole, and not just to user groups such as birders, boaters, fishermen, and hunters that directly benefit from wetlands. Some of the values provided by wetlands (Mitsch and Gosselink, 1986; Sather and Smith, 1984; Office of Technology Assessment, 1984; The Conservation Foundation, 1988) are:

1. Endangered and Threatened Species: A disproportionately high percentage of endangered and threatened species of plants and animals rely on wetlands for their survival.
2. Fish and Shellfish: Some wetlands provide nursery grounds, feeding areas, and year-round habitat for fish and shellfish.
3. Waterfowl and Other Waterbirds: Wetlands are probably most often associated with the role they play in providing nesting, migration, and wintering habitat for waterfowl and other waterbirds.
4. Water and Air Quality: Wetlands have the ability to improve the quality of water in an ecosystem by removing toxic materials and inorganic nutrients from water that flows through them. The vegetation associated with wetlands absorbs pollutants from the air and microbes within mud flats produce oxygen. On a global scale, wetlands improve water and air quality.
5. Flood Control: Wetlands influence regional water flow regimes by intercepting storm runoff and storing storm waters, thereby reducing runoff peaks to slower discharges over longer periods of time.
6. Storm Abatement: Coastal wetlands serve as buffers that protect adjacent urban areas from ocean storms.
7. Recreation and Education: Wetlands provide open space and outstanding opportunities for wildlife-oriented recreation and environmental education.
8. Aesthetics: Wetlands are aesthetically appealing. People enjoy wetlands for their natural beauty, wildness, and solitude.

The decisions that must be made relative to this environmental assessment are:

1. Since the Service has been authorized by Congress to acquire additional acreage for San Francisco Bay Refuge and funds have been appropriated for that purpose, it must be determined which parcels would best meet the purposes of the refuge.

2. It must also be determined what interests should be acquired in those lands identified as potential additions to the refuge.

Issues and concerns relative to this environmental assessment are:

1. Detrimental impacts on wildlife and fishery resources will occur if additional habitat is not preserved, enhanced, or restored.
2. A large sector of the public is concerned about the loss of wetlands, not only in San Francisco Bay, but throughout California, the United States, and around the world.
3. California Senate Concurrent Resolution Number 28 was passed in 1979 stating a goal of increasing wetlands in California by 50 percent by the year 1999.
4. Surveys by the U.S. Fish and Wildlife Service and Canadian Wildlife Service indicated record-low Pacific Flyway waterfowl population numbers in 1989 (U.S. Fish and Wildlife Service Pacific Midwinter Waterfowl Survey, 1989). Lack of wintering habitat has been identified as a major component of these population declines (U.S. Fish and Wildlife Service Concept Plan for Waterfowl Protection, San Francisco Bay, 1989).
5. Additions to San Francisco Bay National Wildlife Refuge will be for the benefit of people using the area to enjoy wildlife-related activities, as well as for the benefit of wildlife, per se.
6. Some municipalities and other groups or individuals prefer development on some of the upland areas and some of the wetland areas that are under consideration for acquisition by the Service.

The importance of acquiring additional acreage to add to the existing wildlife refuge is underscored by the national priorities established by the Service for land acquisition. The San Francisco Bay Area has been identified as 1 of 34 "Waterfowl Habitat Areas of Major Concern" in Canada and the United States as identified in the North American Waterfowl Management Plan. The project area also contains habitats essential to endangered species such as the salt marsh harvest mouse, California clapper rail, and the California least tern (U.S. Fish and Wildlife Service recovery plans, 1980, 1984).

Preservation of additional wildlife habitat at San Francisco Bay is consistent with the following:

1. Mission and goals of the National Wildlife Refuge System.
2. Concept Plan for Waterfowl Habitat Protection, San Francisco Bay, California.

3. North American Waterfowl Management Plan.
4. National Wetlands Priority Conservation Plan.
5. Fishery Resources Program Statement of Responsibilities and Role.
6. Salt Marsh Harvest Mouse & California Clapper Rail Recovery Plan.
7. California Least Tern Recovery Plan.
8. California Brown Pelican Recovery Plan.
9. Peregrine Falcon Recovery Plan.
10. Management Guidelines for the Western Snowy Plover.
11. Nongame Bird Strategies.
12. FISHERIES - USA, Recreational Fisheries Policy of the U.S. Department of the Interior, Fish and Wildlife Service.

II. PROPOSED ACTION AND ALTERNATIVES

A. Combined Fee Title Acquisition, Conservation Easement Acquisition, Lease, and Cooperative Agreement Alternative (The Preferred Alternative)

Under this alternative, the Service proposes to acquire additional lands, marshes, tidal flats, salt ponds, submerged lands, and open waters in the south San Francisco Bay area to add to the existing refuge as authorized and funded by Congress. The term "potential additions" is used herein because not all of the lands will be added to the refuge. Reasons include the following:

1. The existing approved refuge boundary includes 23,000 acres and the potential additions consist of 24,500 acres. This totals 47,500 acres, which is 4,500 acres more than the Service's statutory acquisition authority of 43,000 acres. To date, the San Francisco Bay National Wildlife Refuge consists of 18,219 acres. The Service has authority, therefore, to add an additional 20,000 acres to the refuge beyond the already approved acquisition boundary. Therefore, no more than 20,000 acres out of the 24,500 acres identified by this document would be added to the refuge under existing authorities.
2. The Congressional Record for Public Law 100-556 makes it quite clear that Service plans for acquisition do not preclude lawful, environmentally sound development. Local government has the lead in determining which of the developable properties would be best suited for residential,

commercial, industrial, or conservation use, and this environmental assessment is not intended to influence those land use determinations. It is anticipated that some of the lands identified herein will be developed for other uses. Owners of some of the parcels are in various stages of obtaining development permits and approvals. In these cases, where plans and permits are not approved, entire parcels have been included on the map because there are portions, the locations of which are not yet known, which may be available for refuge acquisition.

3. As a practical matter, the acquisition cost of some of the lands may be prohibitive.
4. The amount of funding which will be available to acquire lands for the refuge is unknown.
5. Some landowners have indicated that they will not be willing sellers of some of the properties included as potential additions.

It is anticipated that the majority of the acreage added to the refuge, including water and mineral rights, would be acquired in fee simple. Water rights and mineral reservations to the owners may be allowed in certain cases where the use, development, and removal would not be destructive to wildlife values and/or where the cost to acquire them would be prohibitive. Perpetual conservation easements and leases may be acquired on a portion of the area in cases where they would meet management objectives and would be acceptable to the landowner. Some land identified for potential addition to the refuge may not be acquired, but may be managed by cooperative agreements between the Service and the landowners. The Service would pursue opportunities for exchanging lands on a limited basis where such exchanges would result in a significant gain of valuable fish and wildlife habitat or necessary buffer areas. For example, the cannery site at Alviso may be exchanged for other desirable property if possible. Cooperative ventures with California Department of Fish and Game, East Bay Regional Park District, and local governments may also be pursued, as would other cost-sharing strategies.

The legislation authorizing the refuge states that "... lands, waters, and interests therein owned by the State of California or any political subdivision thereof may be acquired only by donation." The Service would consider accepting all appropriate donations offered.

The alternative described above is the Service's preferred alternative.

The Service has identified approximately 24,500 acres as potential additions. The final configuration of the acquired lands is impossible to predict, but the identified 24,500 acres provides the Service with many alternatives. Also, an important provision of Public Law 92-330 states in part that "The Secretary may from time to time make corrections in the boundaries of the refuge" It is the Service's intention that this environmental assessment would allow minor refuge expansions in the future beyond those specifically identified in this report, provided that approvals are obtained from the landowner(s) and local government.

Numerous features of a particular land parcel were analyzed when being considered as a candidate for possible addition to the refuge. Lands meeting one of the seven criteria listed below are considered suitable for inclusion in the refuge.

1. Areas important to endangered species, either specified in Recovery Plans or otherwise known.
2. Existing wetlands
 - a. areas of subtidal and tidal wetlands.
 - b. areas of predominantly nontidal wetland.
3. Historic wetlands
 - a. areas easily restored to tidal wetland conditions.
 - b. areas easily restored to nontidal wetland conditions.
4. Areas needed for the purposes of refuge administration.
5. Ecologically integrated uplands and/or buffers.
6. Geographic proximity to the refuge (must be in south bay).
7. Areas sufficiently free of environmental contaminants to comply with Secretarial Order 3127. Secretarial Order 3127 states that the "Department (of Interior) will not acquire such real estate when the costs of remediation of hazardous substances will be borne by the United States taxpayers except at the direction of Congress, or for good cause with the approval of the Secretary.

The priority for protection is as follows.

Priority 1 includes:

- A. Nontidal wetlands. These wetlands are not subject to the ebb and flow of the tides. These include areas commonly referred to as seasonal wetlands, permanent wetlands, farmed wetlands, diked former tidelands, riparian, and other terms.*
- B. Abandoned salt ponds. These are areas formerly used in the salt production process, including but not limited to intake ponds, crystallizer ponds, concentrator ponds, wash ponds, and bittern storage ponds.
- C. Endangered species habitat requiring active management.

Priority 2 includes all other habitat types except active salt ponds. These include all tidal wetland types and uplands (see pages 23 and 24 for a nontechnical description of habitat types). Uplands (nonwetlands) have also been identified for inclusion as potential additions to the refuge where they are interspersed within wetlands, act as buffers to wetlands, have values ecologically integrated with other refuge lands, or are needed for refuge administration.

Priority 3 includes all active salt ponds. Active salt ponds include concentrator ponds and most crystallizer ponds. Purchase of active salt ponds would proceed in accordance with Congressional intent. The Congressional Record for Public Law 100-556 (Senate-10/14/88) states: "The salt ponds contemplated for acquisition are currently used as salt evaporator ponds and salt crystallizer ponds. The acquisition of the lands in active use for salt production is a low priority for the refuge, since the salt production operations are not currently detrimental to the health of wildlife in the refuge. Should the salt production operations be discontinued in the future, the Service should seek to acquire the wetlands on which those operations currently take place." The Service recognizes that generally the salt evaporator ponds have provided, and continue to provide, valuable wildlife habitat.

* Wetland types identified as potential additions to the refuge are classified by the Service as palustrine, lacustrine, or estuarine. For a technical definition of wetland categories, refer to Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al., 1979). This publication describes the wetland classification system adopted by the U.S. Fish and Wildlife Service.

A Tract Profile Form was used to analyze property attributes of potential additions. Completed forms for all parcels considered are located at the refuge headquarters in Fremont, California and at the Service's regional office in Portland, Oregon. Copies of completed forms are available upon request. A copy of the Tract Profile Form is incorporated in this report as page 12.

To complement the Service's efforts to preserve habitat in south San Francisco Bay, the Service would encourage other appropriate agencies, particularly the California Department of Fish and Game and East Bay Regional Park District, to continue their acquisition programs in the bay area. Service representatives will work closely with other agencies to coordinate all acquisition of lands within the project area.

The Service proposes to initiate acquisition during fiscal year 1990. It is anticipated that it will take several years to obtain all of the funding that may be needed, so acquisition would undoubtedly be spread over a relatively long period of time. Payments to the landowners for rights acquired would be based upon a real estate appraisal to determine fair market values as set forth in the Uniform Appraisal Standards for Federal Land Acquisition, 1973.

Lands or interests in lands acquired by the Service would be added to the existing San Francisco Bay National Wildlife Refuge and would be administered in accordance with the Service's environmental impact statement entitled Operation of the National Wildlife Refuge System. All marsh restoration or management projects will be designed to minimize mosquito production. Compatible public use activities would be permitted on lands the Service owns in fee title. Public use rights not acquired by easement would be controlled by the landowner.

Under provisions of the Refuge Revenue Sharing Act (Public Law 95-469), the Service would annually reimburse counties to offset revenue lost as a result of acquisition of private property. This law states that the Secretary of the Interior (Secretary) shall pay to each county in which any area acquired in fee is situated, the greater of the following amounts:

1. An amount equal to the product of 75 cents multiplied by the total acreage of that portion of the fee area which is located within such county; or
2. An amount equal to three-fourths of 1 percent of the fair market value, as determined by the Secretary, for that portion of the fee area which is located within such county; or
3. An amount equal to 25 percent of the net receipts collected by the Secretary in connection with the operation and

management of such fee area during such fiscal year. However, if a fee area is located in two or more counties, the amount for each county shall be apportioned in relationship to the acreage in that county.

There have been occasions in the past when payments to the counties have been less than the legislated amounts because of funding deficits. Congress may appropriate, through the budget process, supplemental funds to compensate local governments for any shortfall in revenue sharing payments. The Refuge Revenue Sharing Act also requires that Service lands be reappraised every 5 years to ensure that payments to local governments remain equitable. Payments under this Act would be made only on lands which the Service acquires in fee title. On lands where the Service acquires only partial interest through easement, all taxes would remain the responsibility of the individual landowner. Payments for fiscal year 1988 were 72 percent of the legislated amounts. However, current taxes on vacant land similar to lands within the potential acquisition area would be lower than the legislated revenue sharing payment in most cases.

Public Law 91-646, The Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended, would provide certain benefits and payments to persons displaced by the acquisition of land.

As a Federal agency, the Service has the right of eminent domain unless, in isolated cases, it is prohibited by Congress. The Congressional Record for Public Law 100-556 states ". . . the Fish and Wildlife Service should continue its present land acquisition policy. Under the policy, the Service uses condemnation proceedings only in cases in which its use would assist in the determination of the legal owner, settle a difference of opinion of value, or prevent uses which would cause irreparable damage to the resources for which the refuge was established."

Tract numbers, tract sizes, and ownerships of the potential refuge additions are shown in Table 1. General locations and tract boundaries are depicted on the enclosed map. Acreage figures and ownership information are based on county records and other sources. The data may change as more accurate information becomes available. The kind of land protection that would occur, i.e., fee, easement, lease, agreement, etc., is discussed in Section II. A. The kind of protection anticipated now may change as negotiations proceed.

TRACT PROFILE FOR PROPOSED ADDITIONS TO SAN FRANCISCO BAY NWR

Property name: _____ Tract # _____
Owner: _____ Total Acreage: _____
City: _____ County: _____

CURRENT LAND STATUS:

Present Use: _____
COE 404 jurisdiction: _____ acres Year: _____
BCDC jurisdiction: _____ acres
National Wetland Inventory: _____ Type _____ Est. acreage
(List type and note if _____
it is decreasing) _____

General Plan Designation: _____

Proposed development: _____

HISTORIC LAND STATUS:

_____ Former Tidal Marsh (Diked?)	_____ Year of USGS map
_____ Former saltpond/crystallizer	_____ Year abandoned (est.)
_____ Farmland	_____ Year abandoned (est.)
_____ Duck club	_____ Year abandoned (est.)
_____ Other	_____

FWS INTEREST:

Endangered Species:
_____ Known to be present: _____
_____ Suspect to be present: _____
_____ Identified in Recovery Plan for Acquisition: # _____

Species of Concern to FWS:

NAWMP decreasing species _ North. Pintail _ Mallard _ Green-winged teal
_____ Sensitive species _____
_____ Aquatic (Fish/invertebrates) species that will benefit _____

Proposed Habitat Management (Migratory birds/endangered species)

_____ Protect as is
_____ Enhance _____ acres as: _____
_____ Restore _____ acres as: _____
_____ Manage as a buffer zone

Public Use: _____

Comments: _____

Completed by: _____ Date: _____

Table 1. Ownerships and Acreages of Lands Within the Potential Refuge Expansion Area

Tract #	Acres	Owner
1a	196.00	United States of America (NASA)
1b	201.00	United States of America (Navy)
2a	173.00	State of California
2b	7.00	State of California
2c	187.00	State of California
2d	139.00	State of California
2e	150.00	State of California
2f	43.00	State of California
2g	28.00	State of California
2h	69.00	State of California
2i	42.00	State of California
2j	58.00	State of California
2k	55.00	State of California
2l	58.00	State of California
2m	19.00	State of California
94	40.00	G.R. Heath Trust
94a	3.00	G.R. Heath Trust
95	283.00	Peery, Arrillaga, and Siri Trusts
96	39.00	Alpha Heath Rogers Trust
127	65.00	Leslie Salt Company
150	700.00	Leslie Salt Company
151	92.00	Leslie Salt Company
152	1,952.00	Leslie Salt Company
153	11.00	Leslie Salt Company
154	2,072.00	Leslie Salt Company
155	599.00	Leslie Salt Company
156	119.00	Leslie Salt Company
157	2,521.00	Leslie Salt Company
158	869.00	Leslie Salt Company
159	2,089.00	Leslie Salt Company
160	867.00	Leslie Salt Company
161	362.00	Leslie Salt Company
162	484.00	Leslie Salt Company
163	668.00	Leslie Salt Company
164	252.00	Leslie Salt Company
165	717.00	Leslie Salt Company
166	1,271.00	Leslie Salt Company
168	418.00	Leslie Salt Company
169	30.00	Leslie Salt Company
201	73.00	Santa Clara Valley Water District
201a	12.00	Santa Clara Valley Water District
202	135.00	City of Redwood City
203	206.00	City of Palo Alto
204	4.00	Union Sanitary District
205	171.00	Alameda County Flood Control
205a	175.00	Alameda County Flood Control
205b	501.00	Alameda County Flood Control

Table 1. Ownerships and Acreages of Lands Within the Potential Refuge Expansion Area (continued)

Tract #	Acres	Owner
205c	.40	Alameda County Flood Control
205d	40.00	Alameda County Flood Control
205e	.10	Alameda County Flood Control
205f	6.10	Alameda County Flood Control
205g	.50	Alameda County Flood Control
205h	2.00	Alameda County Flood Control
205i	400.00	Alameda County Flood Control
206	42.00	City of Mountain View
207	30.00	San Mateo County
208	80.00	City of San Jose
208a	3.16	City of San Jose
208b	40.00	City of San Jose
208c	.10	City of San Jose
208d	1.25	City of San Jose
208e	2.91	City of San Jose
208f	3.75	City of San Jose
208g	3.12	City of San Jose
208h	1.73	City of San Jose
208i	3.80	City of San Jose
208j	2.57	City of San Jose
208k	.83	City of San Jose
208l	2.71	City of San Jose
208m	2.78	City of San Jose
208n	3.68	City of San Jose
208o	3.68	City of San Jose
208p	3.80	City of San Jose
208q	3.87	City of San Jose
208r	.21	City of San Jose
208s	1.73	City of San Jose
208t	2.64	City of San Jose
208u	1.73	City of San Jose
208v	1.04	City of San Jose
208w	.07	City of San Jose
208x	.16	City of San Jose
208y	1.04	City of San Jose
208z	2.05	City of San Jose
209	3.95	Santa Clara County
209a	3.68	Santa Clara County
209b	4.09	Santa Clara County
209c	3.80	Santa Clara County
209d	2.52	Santa Clara County
209e	2.29	Santa Clara County
209f	2.91	Santa Clara County
209g	.90	Santa Clara County
209h	1.67	Santa Clara County
209i	.21	Santa Clara County
209j	.76	Santa Clara County
209k	1.46	Santa Clara County

Table 1. Ownerships and Acreages of Lands Within the Potential Refuge Expansion Area (continued)

Tract #	Acres	Owner
2091	3.05	Santa Clara County
210	33.00	Oliver Properties
210a	131.00	Oliver Properties
210b	155.00	Oliver Properties
211	81.00	Weber, Heil
212	.50	Sharp, Grace
213	25.00	Owens-Corning Fiberglass Corporation
213a	3.00	Owens-Corning Fiberglass Corporation
214	44.00	Munster, Irene
215	17.00	Economy Foods, Inc.
216	155.00	R C K Properties, Inc.
217	122.00	Marathon U.S. Realities, Inc.
218	282.00	Patterson Properties
218a	18.00	Patterson Properties
219	126.00	Mayhews Landing Associates
220	7.00	Estate of Arthur Webster Haley
221	30.00	Oakland Scavenger
221a	120.00	Oakland Scavenger
222	22.00	P.G. & E.
223	26.00	Ponderosa Homes
224	66.00	Santa Fe-Pacific
224a	26.00	Santa Fe-Pacific
225	255.00	Carruf California Corporation
226	93.00	King & Lyons
226a	130.00	King & Lyons
226b	22.00	King & Lyons
226c	.20	King & Lyons
227	4.00	Renco Investment
228	20.00	Onoratto, Marietta
229	471.00	Citation Homes
230	295.00	First City Corporation, et al.
230a	793.00	First City Corporation, et al.
230b	455.00	First City Corporation, et al.
230c	14.00	First City Corporation, et al.
230d	126.00	First City Corporation, et al.
231	152.00	Mid Peninsula Regional Open Space District
231a	54.00	Mid Peninsula Regional Open Space District
232	.21	Peninsula Open Space Trust
232a	.38	Peninsula Open Space Trust
232b	.07	Peninsula Open Space Trust
232c	.21	Peninsula Open Space Trust
232d	.21	Peninsula Open Space Trust
232e	1.07	Peninsula Open Space Trust
232f	.36	Peninsula Open Space Trust
232g	.28	Peninsula Open Space Trust
234	5.00	Beretta, Franco & O'Connor, John
235	.20	Choate Estate, Bea
235a	.20	Choate Estate, Bea

Table 1. Ownerships and Acreages of Lands Within the Potential Refuge Expansion Area (continued)

Tract #	Acres	Owner
235b	.20	Choate Estate, Bea
236	.07	The San Jose House of Benevolence
237	.07	Levin, Donna E.
238	.07	Hamilton et al, Joseph
239	.29	Haag, Russell & Lorraine, Trustees
240	.14	Finck, William
241	1.44	Kelsey et al, Matt
242	.50	Warner, Edith
242a	.10	Warner, Edith
242b	.10	Warner, Edith
246	.07	Sisson, Jennie (Lander)
248	.14	Burns, Ed
249	.36	Fenton, Minna
250	.36	Larkin, Lenore
251	.10	Escalante, Salvador & Gloria
251a	.40	Escalante, Salvador & Gloria
252	.14	Bridges, John M.
253	.36	Giambrone, Joseph & Jenelle
254	.07	Leitao, William
255	.36	Kasper et al, Lenora
256	.07	Freyshlag et al, Oscar K., Trustee
257	.29	Belknap, Forrest
258	.74	Lee, Dale & Roberta
259	.86	Meddock, C.D. & Rhea
260	.13	Cooper, Charlotte
261	.14	Littlejohn, Donald & Florence
262	.14	Depew, Jeffrey & Leeann
263	.07	Chisholm, Carrie
264	.14	DeLorenzo, Dannye
265	.72	Gresham, L.E. & Mary
266	60.00	Liberty Service Corporation
267	34.00	PACCAR
268	35.00	Gimelli et al
269	12.00	Kavanaugh, Clarence
270	10.00	Carnduff et al, Stanley
Total	24,500.00 acres	(rounded to nearest 10 acres)

B. No Action Alternative

Under this alternative the Service would not acquire habitat beyond the existing refuge boundary. This alternative would cost nothing and long-term benefits to wildlife and the public would no doubt be lost or degraded through time. This is not an acceptable alternative for two reasons: 1) Congress authorized and provided funding to enlarge the refuge, and 2) given the Service's statutory obligations and overall mission, a public trust obligation exists to preserve, enhance, and restore as much habitat in the bay area as is reasonably practicable.

C. Fee Title Acquisition Alternative

Under this alternative the Service would seek to acquire in fee title all property rights on up to approximately 20,000 acres of land within the area considered for potential additions to the refuge. All significant wildlife habitats and necessary buffer areas would be protected. Administration and management would be similar to that presented in the previous discussion of the preferred alternative. Since all Service acquisitions would be fee title, payments to the counties under the terms of the Refuge Revenue Sharing Act would apply to all lands acquired.

D. Conservation Easement Acquisition Alternative

Under this alternative the Service would seek to purchase perpetual conservation easements on up to approximately 20,000 acres of land. No land would be acquired in fee title. The rights needed to protect, enhance, and manage the habitat would be purchased. For this alternative to be effective, it would be necessary to acquire development rights, and any other rights, which if not acquired, would work contrary to the purposes of the refuge. To obtain all of these rights, the cost may nearly equal the cost for fee title purchase, but the Service would not have as much management flexibility as under the preferred alternative. The landowner would remain responsible for all property taxes and control of trespass.

E. Acquisition/Management by Others Alternative

Organizations or agencies other than the Fish and Wildlife Service could acquire and manage the acreage that the Service is proposing to acquire. Some parcels of land adjacent to the refuge are owned and managed by California Department of Fish and Game, East Bay Regional Parks District, and several city and county entities. The California State Lands Commission has \$8 million designated for acquisition of wetlands in south San Francisco Bay and it is anticipated that they will acquire some land within the potential refuge expansion area with these funds. Acquisition by other agencies is encouraged by the Service if management by them would be consistent with habitat protection

objectives. It is not anticipated that other agencies will be able to protect, enhance, and/or restore, and manage a significant portion of those lands identified for potential expansion of the refuge.

F. Other Alternatives

Relying on current zoning or requesting new zoning to protect habitat was considered as an alternative. However, current zoning or rezoning on some parcels would not protect the resource in perpetuity because zoning can change. Therefore, this alternative is not viable.

The concept of using the priorities described on page 9 as alternatives A, B, and C, rather than using the alternatives described above was given serious thought and consideration. For example, alternative A could be priority 1; alternative B could be priorities 1 plus 2; and alternative C could be a combination of priorities 1 plus 2 plus 3. This scenario was discarded as not being adequately responsive to the intent of the legislation because it could unnecessarily limit the opportunity to protect habitats important to the pursuit of refuge purposes.

G. Comparative Evaluation of Alternatives

The preferred alternative (combined fee title acquisition, conservation easement acquisition, lease, and cooperative agreement) was selected for the following reasons:

1. It is the most practical and feasible of the alternatives considered and would provide for long-term protection, enhancement, and restoration of habitat in order to meet the needs of wildlife and people.
2. It is the most cost-effective means to preserve, enhance, and restore the natural resources.
3. It would provide the most management flexibility compared with other feasible alternatives.
4. It is consistent with Service goals in meeting objectives of the Endangered Species Act.
5. It is in accordance with the North American Waterfowl Management Plan.
6. It is consistent with Service goals to provide habitat and management for many species of waterfowl, waterbirds, anadromous fish, shellfish, and other wildlife, including endangered and sensitive species.

7. It is in accordance with recovery plans for the salt marsh harvest mouse, California clapper rail, California least tern, brown pelican, and peregrine falcon.

The following alternatives were not selected as the preferred alternative for the following reasons:

1. No Action

- a. This alternative would not provide sufficient protection of the natural resources and not increase opportunities for public enjoyment.
- b. It is not in keeping with the spirit of Public Law 100-556 and Congressional appropriations.
- c. It is not consistent with Service responsibilities under the Endangered Species Act and the Migratory Bird Treaty Act.

2. Total Fee Acquisition:

- a. It would be more costly than the preferred alternative.
- b. It would not meet Service policy of acquiring the least interest that will allow meeting objectives.
- c. It would exclude landowners who want to sell a lesser interest and other public agencies interested in cooperative agreements.

3. Total Conservation Easement Acquisition:

- a. It would not provide for desired management flexibility.
- b. It would cost nearly as much as the preferred alternative.
- c. It would not accomplish Service objectives for the area.
- d. It would exclude landowners who want to sell only fee title.

4. Acquisition/Management by Others:

- a. It would not be consistent with the intent of Congressional legislation.
- b. There is no reason to believe that action will be taken by others in time to preserve the ecological integrity of the entire project proposal. Other agencies have different goals or missions than the Service, and

therefore would probably not be interested in acquiring all of the acreage Congressionally authorized for acquisition by the Service. If interested in the legislated acreage, it is likely that they would not have sufficient funds to acquire all of it.

III. AFFECTED ENVIRONMENT

A. Physical Environment

San Francisco Bay is one of the nation's major estuaries and is located in the Coast Range of mountains which lie along the western edge of California. For purposes of this report, "the bay" includes all of San Pablo Bay and all of San Francisco Bay. It does not include Suisun Bay or the Sacramento-San Joaquin Delta. The bay is about 55 miles long and 12 miles wide at its widest point. Its watershed (excluding the Sacramento and San Joaquin Rivers) covers 3,500 square miles, while the 9-county bay area (Alameda, San Mateo, Santa Clara, Marin, Sonoma, Solano, Contra Costa, Napa, and San Francisco) totals nearly 7,000 square miles.

The project area within the proposed refuge expansion is typical of south San Francisco Bay in that the topography is flat and few locations are above high tide. Although natural values have been modified extensively by human activity (Nichols et al., 1986) and the continuing problem of pollution exists (Citizens for a Better Bay, 1983), the project site is rich ecologically, supporting substantial and diverse wildlife populations. This is demonstrated by the fact that 70 percent of all shorebird species using the Pacific Flyway inhabit the marshes, mudflats, open water, and salt ponds of the area.

Much of San Francisco Bay is shallow, with an average depth of only 20 feet. The southern end of the bay is even shallower, generally averaging less than 10 feet. Only 15 percent of the bay is more than 30 feet deep, although a few deeper channels representing dredged drainage systems are present and provide access for ocean-going vessels.

The bay area has a modified Mediterranean climate, with warm to hot, dry summers and moist, mild winters. The varied topography of the area permits wide variation in local climate in terms of temperature, rain, wind, and fog. Average annual rainfall in the south bay is 16 inches, which occurs primarily between November and April. The prevailing wind direction is from the northwest with maximum speeds generally occurring by late afternoon. During the night and early morning, the light winds reverse to the southeast direction. The influence of the ocean affects this daily wind cycle. Cooling sea breezes and high fog in summer produce a moderating effect, so that coastal and bay area cities

seldom experience temperature extremes. In the south bay, mean monthly air temperatures range from 48 to 68 degrees Fahrenheit.

Most lands within the project area occur within four major soil associations or map units. The Alviso Association consists of fine-textured soils that are influenced by tidal water. These soils are very poorly drained and have developed into gleyed (a sticky, bluish-gray soil layer), fine-textured alluvium. They occupy level tidal flats along San Francisco Bay at elevations from sea level up to 10 feet. Vegetation consists of water loving plants, saltgrasses, and forbs. The average growing season for vegetation in the areas occupied by this soil association is 300 to 325 days. Alviso soils comprise up to 85 percent of the Alviso Association. Alviso soils include dark gray clay surface soils and gleyed, gray, silty clay subsoils. They overlie gleyed alluvium mixed with layers of organic matter, and they are affected by high concentrations of salt. Surface soil averages 6 to 10 inches in thickness and the subsoil averages 30 to 40 inches in thickness (Soil Conservation Service, 1968).

The Tidal Marsh Association occurs on areas periodically covered by tidal water. Eighty-five percent of this association is tidal marshland, and 15 percent is Alviso soils. These surface soils are highly expansive, providing poor foundation material which may settle and cause damage to structures placed upon them. Bayland soils also have a high risk to property because of the possibility of lateral spreading, liquefaction, and amplification of the intensity of ground shaking during large earthquakes (U.S. Fish and Wildlife Service Final Environmental Statement, 1977).

Soils found in the Reyes-Urban Land Unit are nearly level, very poorly drained clays on tidal flats, and Urban Land. Soils found in the Clear Lake-Omni-Urban Land Unit are nearly level to moderately sloping, poorly drained clays and silty clay loams, and Urban Land; on the basin rim (Soil Conservation Service, 1981).

Two distinct units that comprise the geologic formations underlying the bay are an older bedrock unit and a younger, unconsolidated sedimentary sequence. The bedrock is generally composed of sandstone, siltstone, chert, and greenstone of the Franciscan formation and is deeper in the southern part of the bay where depths of 300 to 800 feet are common. The surface of the bedrock is very irregular.

The depletion of groundwater in deep aquifers has resulted in consolidation of clay layers and is responsible for the subsidence occurring in the south bay. Since 1934, the ground surface elevation of land in the area of Alviso has subsided about nine feet (U.S. Fish and Wildlife Service Final Environmental Statement, 1977).

Because San Francisco Bay National Wildlife Refuge is located in an urban area, there are numerous underground structures such as water and sewage transportation pipes occurring within the area proposed for acquisition. Portions of the project area are crossed by Southern Pacific Railroad rights-of-way, Pacific Gas and Electric Company rights-of-way, and many others too numerous to mention. During the acquisition process, Service representatives will make every effort to coordinate any needs for easements, rights-of-way, surface use agreements, etc. with the appropriate owners or agencies.

There is a proposal for construction of a new freeway, route 61, that could go through part of the proposed refuge additions, and Thornton Avenue may be widened within the next few years. There are also plans for an improved freeway interchange at the intersection of the 880 Freeway and Dixon Road. If these or other projects are actually proposed for implementation in the future, compliance with all appropriate permitting procedures that are mandated by law would be required, when and if the projects are funded and/or rights-of-way are requested.

Establishment of refuge status over lands designated for roadway construction does not necessarily negate such projects. For example, the current Dumbarton Bridge realignment was recently constructed through the refuge.

The Service recognizes the Federal responsibilities for Naval aviation and National Aeronautics and Space Administration (NASA) research on Federal lands included in the proposed refuge expansion. These Federal agencies are seeking to enhance wildlife habitat whenever compatible with their respective missions. Inclusion in the project area will enable these Federal agencies to request overlay refuge status which would be one of the several options available to these agencies. Current Naval and NASA aviation and aerospace research practices are expected to continue.

B. BIOLOGICAL ENVIRONMENT

Historically, the San Francisco Bay area supported an incredible variety and abundance of wildlife. This is described very well in the following quote from author Malcolm Margolin in his book The Ohlone Way: "Two hundred years ago herds of elk and antelopes dotted the hills above present-day San Francisco, Oakland, San Jose, and Monterey. Grizzly bears lumbered down to the creeks to fish for silver salmon and steelhead trout. From vast marshlands geese, ducks, and other birds rose in thick clouds 'with a sound like that of a hurricane'."

The biological environment of San Francisco Bay has been altered drastically from pristine conditions. Since the time of early European settlement in California, tidal marshes and unvegetated

portions of the bay were diked and filled for agricultural purposes, urban development, and salt production. Extensive introductions of nonnative fauna and flora drastically changed the aquatic invertebrate community of the bay. Hydraulic mining for gold in the Sierra Nevada Mountains caused rapid sedimentation in the bay. Agricultural development and urban growth coupled with government sponsored flood control and irrigation projects drastically altered the bay's water regime. Increased needs for water for agriculture and urban areas decreased the freshwater flows into the bay by 60 percent, and also caused the lowering of groundwater tables. Historically high winter/spring inflows have been greatly reduced, while summer/fall flows have increased.

Ever-increasing point and nonpoint pollution inflows into south bay have caused undesirable changes in the wetland ecosystem (Nichols et al, 1986). One example of change is the conversion of approximately 260 acres of tidal salt marsh to brackish marsh due to increased freshwater flows in south bay. The resultant change in vegetation types and loss of salt marsh habitat have contributed to reduced numbers of endangered California clapper rails (U.S Fish and Wildlife Service, 1989. Unpublished data). In addition, increasing levels of contaminants such as selenium pose threats to wildlife (Ohlendorf et al., 1989). This extensive pattern of habitat loss and degradation has had a net detrimental effect on fish and wildlife using the bay. Some species have been extirpated, others are now endangered, and many continue to decline. If habitat loss and degradation continues, irreversible and irreparable damage to the bay ecosystem will occur.

The numerous habitats considered for additions to the refuge, totaling approximately 24,500 acres, may be grouped into seven habitat "types" or categories. The acreage of each habitat type was determined from the Service's National Wetlands Inventory maps and County records. Following is a brief description of each habitat type:

1. Salt ponds - 58 percent; 14,260 acres. Salt ponds are diked lands where pumped bay estuarine water is evaporated, concentrated, and crystallized for recovery of natural salts found in San Francisco Bay water. Salt ponds are classified as artificially flooded lacustrine wetlands by the Service (see footnote on page 9).
2. Freshwater wetlands - 22 percent; 5,270 acres. Freshwater wetlands are lands saturated or flooded by freshwater, seasonally or permanently. They may be vegetated or non-vegetated. They include lands commonly identified as seasonal wetlands, permanent ponds, permanent lakes, seasonal ponds, seasonal lakes, marshes, wet meadows, diked former

tidelands, and riparian. Freshwater wetlands are classified as palustrine or lacustrine wetlands by the Service.

3. Salt marsh - 7 percent; 1,710 acres. Salt marshes are vegetated lands periodically inundated and exposed by estuarine tidal water. Salt marsh is classified as estuarine, intertidal, emergent wetland by the Service.
4. Uplands - 6 percent; 1,480 acres. Uplands are all lands other than those described in this section.
5. Mud flats - 3 percent; 810 acres. Mud flats are unvegetated lands periodically inundated and exposed by estuarine tidal water. Mud flat is classified as estuarine, intertidal, unconsolidated shore wetland by the Service.
6. Farmed wetlands - 2 percent; 590 acres. Farmed wetlands are lands where the soil surface has been mechanically or physically altered for production of crops, but wetland plants will be reestablished if farming is discontinued. This is the same definition used by the Service.
7. Estuarine open water - 2 percent; 380 acres. Estuarine open water is the "salt" water which permanently covers the bay and channels. The Service classifies this habitat type as an estuarine, subtidal, deepwater habitat.

In spite of all that has been altered in the bay, it is still one of the most important wetland migration areas for shorebirds and other waterbirds between Alaska and Peru. On April 16-18, 1988, the Point Reyes Bird Observatory (Observatory) conducted a shorebird census of San Pablo and San Francisco Bays. Observers counted 838,000 shorebirds of 28 species. Given the potential for some error, the Observatory estimates that between 600,000 and 1,200,000 shorebirds were present on the weekend count. A second springtime shorebird survey was conducted by the Observatory in April 1989. During this survey over 930,000 shorebirds were observed along the tidal mudflats and adjacent wetland areas. The majority of these birds were concentrated in south San Francisco Bay. In April of 1990, San Francisco Bay National Wildlife Refuge will be designated as a Hemispheric Shorebird Reserve because of the wildlife values this protected habitat provides for shorebird populations.



Figure 1. Nontidal Wetlands

USFWS File Photo



Figure 2. Foreground - Salt Pond, Formerly Tidal Marsh
Background - Tidal Marsh

USFWS Photo by Roy Lowe

A checklist entitled Birds of San Francisco Bay and San Pablo Bay National Wildlife Refuges was compiled by the San Francisco Bay Bird Observatory with the assistance of many experienced ornithologists and veteran birders. This list, which includes 281 species, underscores the importance of the San Francisco Bay area as bird habitat and emphasizes the great diversity of bird life that occurs in the bay. The checklist is enclosed as a separate document with this environmental assessment. It includes all species that are found in San Francisco Bay and the Delta. It does not include all species that can be found in nearby upland habitats.

Endangered bird species that occur within the project area are the brown pelican, bald eagle, peregrine falcon, California clapper rail, and California least tern. Surveys conducted during the winter of 1989-90 indicate that the California clapper rail population has declined severely since the early to mid-1980's. Preservation and enhancement of habitat in south bay are critical if populations of clapper rails and least terns are to be sustained (U.S. Fish and Wildlife Service, 1984, Salt Marsh Harvest Mouse & California Clapper Rail Recovery Plan; and U.S. Fish and Wildlife Service, 1980, California Least Tern Recovery Plan). The great majority of the remaining California clapper rail population (81 percent) is found in the south bay. Areas within the refuge expansion area that are of particular importance to the recovery of the clapper rail include large restorable tracts such as Bair Island (tracts 202, 216, and 230,a,b,c), Baumberg tracts (tracts 150, 152, and 154), and tract 203 in the city of Palo Alto. Areas of particular importance to least terns include the Baumberg tract salt ponds, Bair Island, Charleston Slough, and Leslie salt ponds (tracts #159-163). Potential additions (tracts 127, 150, and 159, for example) within the project would preserve habitat important for sustaining San Francisco Bay populations of snowy plovers, a species that has been petitioned for Federal listing. In addition, the California black rail, a State-listed threatened species and a candidate for Federal listing, resides within the project area.

San Francisco Bay is one of the most important coastal wintering and migration areas in the Pacific Flyway for waterfowl. Midwinter inventories of duck populations in the bay have averaged nearly 221,000 ducks in recent years. This average represents 7.7 percent of all ducks in California. During the 1989 midwinter inventories conducted in California, 41.7 percent of all diving ducks and 47.3 percent of all sea ducks recorded, were observed in San Francisco Bay.

San Francisco Bay is the most important wintering area for canvasbacks in the Pacific Flyway. Canvasback populations in the bay have averaged 18,500 ducks during the 1984-89 midwinter inventories. Other diving ducks and sea ducks that occur in the bay in large numbers include greater and lesser scaup, ruddy

duck, scoter, and bufflehead. These ducks have averaged 73,800; 24,800; 29,700; and 3,900, respectively during the 1984-89 midwinter inventories for the bay. Northern shoveler, American wigeon, northern pintail, and gadwall are the most abundant dabbling ducks found in the project area. These dabbling ducks have averaged 28,300; 14,900; 8,900; and 3,100, respectively during the 1984-89 midwinter inventories for the bay. Canada geese are observed in relatively small numbers around the bay. Recent studies have shown that wetlands in the project area support all of these waterfowl species during the winter period.

The bay area provides habitat for 47 species of mammals. The salt marsh harvest mouse is an endangered species that requires tidal and nontidal wetlands around the bay for survival (U.S. Fish and Wildlife Service Recovery Plan, 1984). The salt marsh wandering shrew, which the Service has been petitioned to list as an endangered species, also inhabits some areas around the bay. The most important marine mammal associated with wetlands within the project boundary is the harbor seal. This species uses tidal salt marshes and mudflats for breeding and hauling-out grounds. The largest haul-out sites in San Francisco Bay are located in south bay. Other mammals common to the area are raccoon, brush rabbit, big brown bat, Brazilian free-tailed bat, gray fox, and California ground squirrel. Nonnative red foxes are becoming increasingly abundant in the south bay area and are threatening California clapper rail populations (U.S. Fish and Wildlife Service, 1989. Unpublished data).

San Francisco Bay waters, with the proper control of pollutants, have the potential to support a substantial fishery in the bay area. Salt marshes and shallow water areas provide for larval, young, juvenile, and adult fishes and shellfish such as shiner perch, top smelt, staghorn sculpin, halibut, striped bass, clams, crabs, mussels, and bay shrimp. Important commercial and sport fishes that utilize deepwater habitats include northern anchovy, starry flounder, striped bass, king salmon, sturgeon, and American shad (U.S. Fish and Wildlife Service, 1989. Concept Plan for Waterfowl Habitat Protection, San Francisco Bay).

Seventeen species of reptiles and 13 species of amphibians inhabit the project area.

A Section 7 Endangered Species Internal Consultation has been completed for this project. This consultation concluded that the acquisition, restoration, enhancement, and protection of the habitat included within the project boundary would enhance the viability of all of the listed and candidate species occurring there.

C. Contaminants and Hazardous Wastes

Studies of the San Francisco Bay area indicate that various sources of environmental pollutants from industrial, agricultural, and municipal sources are present (Nichols et al, 1986; Citizens for a Better Environment, 1983, 1987; Phillips, 1987). Studies in San Francisco Bay have shown elevated levels of selenium in diving ducks and some metals in bivalve mollusks (Ohlendorf et al., 1989). "Hot spots" containing hazardous wastes may exist within the area proposed for refuge acquisition as the result of industrial activities and old municipal dump sites or fills. Prior to acquisition of any land, each parcel identified for acquisition will be surveyed for hazardous waste potential according to established policy.

D. Cultural and Social Environment

When San Francisco Bay was discovered by the Spaniards in 1769, they found that the land around the bay was inhabited by the Ohlone people (Margolin, 1978). These people were also called Costanoan, which is derived from the Spanish word Costanos, meaning "coast people." The Costanoan-speaking people lived in approximately 50 separate and politically autonomous nations or tribelets. Linguistic evidence suggests that the ancestors of the Ohlones moved into the San Francisco and Monterey Bay areas about 500 A.D. Food for the Ohlones was plentiful in the form of fish, shellfish, waterfowl, quail and other small birds, large and small mammals, reptiles, berries, acorns, other nuts, and seeds. In 1797 the Spanish Franciscan Fathers founded the Mission San Jose, which was one day's journey from San Jose and Yerba Buena. Baptismal records from this mission and others in the area indicate that the last Costanoan tribelets living an aboriginal existence had disappeared by 1810. In 1971 descendants of the Costanoans united into the Ohlone Indian Tribe.

The discovery of gold in northern California in 1848 brought a tremendous influx of "American" settlers, Chinese, and many other ethnic groups. By this time, the new state probably contained the greatest conglomeration of people ever assembled in one area. Farming, ranching, industry, and shipping flourished. World War II marked the most sudden increase in the economy of the south bay with the establishment of many new industries. Manufacturing accounted for a major increase in employment, while food processing, which had been a major economic factor, began to decline as agricultural lands were converted to subdivisions and other uses. According to the 1970 Census of Population, there were 4,519,200 people living in the San Francisco Bay area. This was an increase of 843,000 over the 1960 census. Now the population of the bay area is nearly 6 million people, the fourth most populous metropolitan area in the United States behind New York, Los Angeles, and Chicago. The bay area population is

expected to increase to about 6.5 million by the end of this century.

An archaeological records search was completed for the project area by the California State Historic Preservation Office's Northwest Information Center. The area is rich in archaeological and ethnographic sites and historical landmarks. Results of the records search are on file in the Service's regional office in Portland, Oregon.

The project area, in which additions to the refuge are proposed, is located in Alameda, San Mateo, and Santa Clara Counties.

Alameda County, which was named after Arroyo del Alameda, was created in 1853 with the seat of government established at Alvarado in Washington Township. The county encompasses an area of 743 square miles. Providing services such as hotel lodging, business services, health services, etc. is the leading industry in the county. Other industries in order of magnitude (ranked according to numbers of people employed) are government; retail trade; manufacturing; wholesale trade; transportation and public utilities; construction and mining; finance, insurance, and real estate; and agriculture. The population of the county was 1,105,379 in 1980; 1,252,425 in January 1989; and the projected population for the year 2000 is 1,360,300.

When California entered the Union in 1850, San Francisco County included the entire west bay peninsula. In 1856, the southern part of San Francisco County (about 85 percent of the original county) was detached to form San Mateo County, which encompasses 447 square miles. Providing services is the leading industry in the county. Other industries in order of magnitude are retail trade; manufacturing; transportation and public utilities; government; wholesale trade; finance, insurance, and real estate; construction and mining; and agriculture. At the time the county was organized, it had 3,124 inhabitants. The population of the county was 587,329 in 1980; 632,800 in January 1989; and the projected population for the year 2000 is 646,300.

Santa Clara County was established in 1850. The county encompasses an area of 1,300 square miles. The leading industry in the county is manufacturing. Other industries in order of magnitude are services; wholesale and retail trade; government; construction; finance, insurance, and real estate; transportation and public utilities; agriculture; and mining. The population of the county was 1,295,071 in 1980; 1,440,915 in May 1989; and the projected population for the year 2000 is 1,581,000.

Additions to the existing wildlife refuge could provide significant recreational opportunities for several million people who live in and adjacent to San Francisco Bay, as well as for visitors from other states and countries. Some of the

recreational activities that are enjoyed by people at the refuge include biking, birding, boating, fishing, hiking, hunting, jogging, painting, photography, and star-gazing.

The Service will cooperate with other agencies regarding recreational activities around south bay, such as the Association of Bay Area Governments' Bay Trail System.

Wildlife/wildland oriented public use will be encouraged on Service lands where funds are available to support such use and where such activities are compatible with refuge purposes. Public use programs will provide a wide array of opportunities for the visitor to enjoy the resource and to gain an understanding and appreciation for fish and wildlife, wildlands ecology, and wildlife management. Through careful planning, the Service can protect fish and wildlife resources and their habitats while providing substantial and varied educational and recreational opportunities to the visiting public. An increased public environmental knowledge and understanding will be beneficial to the resource through greater acceptance of existing and future conservation and management programs.

Public use will be in strict conformance with applicable Federal and State statutes. Special attention will be directed toward assuring that all public uses are compatible with the refuge's primary purposes. New on-site activities will be wildlife and/or wildlands-related wherever possible. Unless prohibited by statute or regulation, both consumptive and nonconsumptive utilization will be encouraged as a means of enabling the public to understand and appreciate the unique attributes of lands and facilities set aside for natural resource protection.

All of the cities and counties within the project area support preservation of the natural environment, wildlife, wildlife habitat, and open space. For example, under the Marinelife and Wildlife Resources section of the City of San Jose's Horizon 2000 General Plan, the stated goal is to "Preserve areas of special marine and wildlife habitation, particularly those containing endangered species, as living research and recreational resources, and as indispensable parts of the total environment." Most of the cities and counties within the project area have similar stated goals in their general or specific plans. Some of the affected cities and counties are undergoing general plan updates, but in most cases the Service's proposal is consistent with existing plans and with the direction most local jurisdictions are taking. Some of the lands within the project area are not designated, or are designated for residential, commercial, or industrial use. Some of the parcels are designated "urban reserve." In the case of Redwood City, for example, urban reserve is defined as "Land to be preserved for future use to expand the limits of the urbanized area of the City. Exact land use designations are to be withheld pending

review of development plans and their environmental consequences." As stated elsewhere in this assessment, the Service's acquisition plans do not prohibit environmentally sound development which conforms to local plans. A tract-by-tract comparison with general plan designations is included as Table 2.

The protection of these natural areas is critical not only for wildlife, but to maintain the quality of life of all bay area inhabitants. Preserving these wetlands, which constitute a public trust of greater value than many realize, results in multibenefits not only to the cities and counties, but also to the people living there, as well as those living around the entire nation and world.

Table 2. General Plan Designations by Tract Number (corresponds with map)

TRACT	CITY/COUNTY	GENERAL PLAN DESIGNATION
1a(NASA)	Mountain View	Transportation
1b(Navy)	Sunnyvale	Public/Government Baylands
2a	Hayward	Waterways
2b	Hayward	Waterways
2c	San Jose	Private Open Space/Waterways mix
2d	Mountain View	Waterways
2e	Fremont	Open Space
2f	Fremont	Open Space
2g	Fremont	Open Space
2h	Menlo Park	Limited Industrial/Non Urban Marshes mix
2i	Redwood City	Open Space and Waterways
2j	Redwood City	Waterways
2k	Redwood City	Waterways
2L	Redwood City	Open Space and Waterways
2m	Redwood City	Waterways
94	Newark	Undesignated (conservation or industrial being considered)
94a	Newark	Undesignated (conservation or urban reserve being considered)
95	Newark	Undesignated (limited industrial, housing/ recreation mix or conservation being considered)
96	Newark	Undesignated (conservation or industrial being considered)
127	Newark	Community Recreation/Industrial mix (conservation or conservation/special industrial business park mix being considered)
150	Hayward	Open Space (Baylands)
151	Fremont	Industrial
152	Hayward	Open Space (Baylands)
153	Newark	Industrial (special industrial business park, residential or conservation being considered)
154	Hayward	Open Space (Baylands)
155	Hayward	Open Space (Baylands)
156	Newark	Industrial/Undesignated mix (special industrial park, residential or conservation being considered)
157	Newark	Undesignated (urban reserve/conservation mix or agricultural/conservation mix being considered)
158	San Jose	Private Open Space
159	San Jose	Private Open Space
	Sunnyvale	Resource Conservation Area-Baylands
160	Sunnyvale	Public/Government-Baylands
	San Jose	Private Open Space
161	Santa Clara County	Resource Conservation Area-Baylands
162	Santa Clara County	Resource Conservation Area-Baylands
163	Sunnyvale	Resource Conservation Area-Baylands
	Santa Clara County	Resource Conservation Area-Baylands
164	Menlo Park	Non Urban (Salt Ponds)

Table 2. General Plan Designations by Tract Number (continued)

TRACT	CITY/COUNTY	GENERAL PLAN DESIGNATION
165	Menlo Park	Non Urban (Salt Ponds)
166	Redwood City	Urban Reserve/Open Space mix
168	Fremont	Agriculture
169	San Jose	Private Open Space
201	San Jose	Private Open Space
201a	San Jose	Private Open Space
202	Redwood City	Open Space
203	East Palo Alto	Non Urban (Marsh)
204	Fremont	Industrial/Open Space mix
205	Union City	Open Space
	Fremont	Open Space
205a	Union City	Open Space
205b	Hayward	Open Space (Baylands)
205c	Newark	Community Recreation (conservation being considered)
205d	Newark	Undesignated (conservation and urban reserve being considered)
205e	Hayward	Open Space (Baylands)
205f	Fremont	Open Space
205g	Newark	Community Recreation (conservation being considered)
205h	Hayward	Baylands
205i	Fremont	Institutional Open Space
206	Mountain View	Baylands
207	Redwood City	Urban Reserve
208	San Jose	Public/Quasi-Public
208a	San Jose	Private Open Space
208b	San Jose	Public/Quasi-Public
208c	San Jose	Private Open Space
208d	San Jose	Private Open Space
208e	San Jose	Private Open Space
208f	San Jose	Private Open Space
208g	San Jose	Private Open Space
208h	San Jose	Private Open Space
208i	San Jose	Private Open Space
208j	San Jose	Private Open Space
208k	San Jose	Private Open Space
208L	San Jose	Private Open Space
208m	San Jose	Private Open Space
208n	San Jose	Private Open Space
208o	San Jose	Private Open Space
208p	San Jose	Private Open Space
208q	San Jose	Light Industrial
208r	San Jose	Private Open Space
208s	San Jose	Private Open Space
208t	San Jose	Private Open Space
208u	San Jose	Private Open Space
208v	San Jose	Private Open Space
208w	San Jose	Private Open Space
208x	San Jose	Private Open Space

Table 2. General Plan Designations by Tract Number (continued)

TRACT	CITY/COUNTY	GENERAL PLAN DESIGNATION
208y	San Jose	Private Open Space
208z	San Jose	Private Open Space
209	San Jose	Private Open Space
209a	San Jose	Private Open Space
209b	San Jose	Private Open Space
209c	San Jose	Private Open Space
209d	San Jose	Private Open Space
209e	San Jose	Private Open Space
209f	San Jose	Private Open Space
209g	San Jose	Private Open Space
209h	San Jose	Private Open Space
209i	San Jose	Private Open Space
209j	San Jose	Private Open Space
209k	San Jose	Private Open Space
209L	San Jose	Private Open Space
210	Hayward	Open Space (Baylands)
210a	Hayward	Open Space (Baylands)
210b	Hayward	Open Space (Baylands)
211	Hayward	Industrial/Open Space (Baylands) mix
212	Newark	Community Recreation (conservation being considered)
213	San Jose	Private Open Space
213a	San Jose	Private Open Space
214	Union City	Open Space
215	Menlo Park	Limited Industrial/Low Density Residential/ Public & Quasi-Public (Landscaped Greenways, Buffers or Parkways) mix
216	Redwood City	Urban Reserve
217	Hayward	Industrial
218	Fremont	Open Space (Institutional and Urban Reserve)
218a	Fremont	Park/Buffer Zone mix
219	Newark	Residential/Community Recreation mix (conservation or residential/conservation mix being considered)
220	Newark	Community Recreation (conservation being considered)
221	Fremont	Industrial
221a	Fremont	Industrial
222	Fremont	Industrial
223	Union City	Open Space/Buffer Zone mix
224	Fremont	Industrial
224a	Fremont	Industrial
225	Fremont	Industrial
226	Fremont	Open Space
226a	Fremont	Industrial/Open Space mix
226b	Fremont	Industrial
226c	Newark	Community Recreation (conservation being considered)
227	Fremont	Industrial
228	Fremont	Agriculture

Table 2. General Plan Designations by Tract Number (continued)

TRACT	CITY/COUNTY	GENERAL PLAN DESIGNATION
229	San Leandro	Industrial
230	Redwood City	Urban Reserve
230a	Redwood City	Urban Reserve
230b	Redwood City	Open Space
230c	Redwood City	Open Space
230d	Redwood City	High Residential/Medium Residential/Light Commercial/Open Space mix
231	Menlo Park	Public & Quasi-Public (landscaped greenways, buffers or parkways)
231a	Santa Clara County	Resource Conservation Area
232	San Jose	Private Open Space
232a	San Jose	Private Open Space
232b	San Jose	Light Industrial
232c	San Jose	Private Open Space
232d	San Jose	Light Industrial
234	Union City	Open Space/Residential mix
235	San Jose	Private Open Space
235a	San Jose	Private Open Space
235b	San Jose	Private Open Space
236	San Jose	Private Open Space
237	San Jose	Private Open Space
238	San Jose	Private Open Space
239	San Jose	Private Open Space
240	San Jose	Private Open Space
241	San Jose	Private Open Space
242	San Jose	Private Open Space
242a	San Jose	Private Open Space
242b	San Jose	Private Open Space
243	San Jose	Private Open Space
244	San Jose	Light Industrial
244a	San Jose	Private Open Space
245	San Jose	Light Industrial
246	San Jose	Private Open Space
247	San Jose	Private Open Space
248	San Jose	Private Open Space
249	San Jose	Private Open Space
250	San Jose	Private Open Space
251	San Jose	Private Open Space
251a	San Jose	Private Open Space
252	San Jose	Private Open Space
253	San Jose	Private Open Space
254	San Jose	Private Open Space
255	San Jose	Private Open Space
256	San Jose	Private Open Space
257	San Jose	Private Open Space
258	San Jose	Private Open Space
259	San Jose	Private Open Space
260	San Jose	Private Open Space
261	San Jose	Private Open Space
262	San Jose	Private Open Space

Table 2. General Plan Designations by Tract Number (continued)

TRACT	CITY/COUNTY	GENERAL PLAN DESIGNATION
263	San Jose	Private Open Space
264	San Jose	Private Open Space
265	San Jose	Private Open Space
265a	San Jose	Private Open Space
265b	San Jose	Private Open Space
266	San Jose	Light Industrial
267	Newark	Undesignated (conservation or urban reserve being considered)
268	San Jose	Private Open Space
269	Menlo Park	Industrial
270	Menlo Park	Industrial

IV. ENVIRONMENTAL CONSEQUENCES

This section is an assessment of the individual alternatives. It analyzes the environmental consequences or impacts that would be expected to occur from implementation of the alternatives described in Section II. The phrase "environmental consequences" should be understood to include not only the physical and biological environment of the project area, per se, but also the effects upon the human population which is part of the associated environment.

A. Combined Fee Title Acquisition, Conservation Easement Acquisition, Lease, and Cooperative Agreement Alternative (The Preferred Alternative)

1. This action offers the most comprehensive, most cost effective, and most feasible solution for protecting, enhancing, and/or restoring approximately 20,000 acres of habitat in the south bay area. The properties acquired, and those covered by conservation easements or agreements, would become a part of San Francisco Bay National Wildlife Refuge. These additions, like the rest of the refuge, would be managed to maximize their wildlife values.
2. This action provides potential for enhancing and restoring freshwater wetlands which do not currently comprise a substantial portion of the refuge. Additionally, freshwater wetlands are the most rapidly disappearing wetland types in the south bay (U.S. Fish and Wildlife Service Concept Plan, 1989). Such action would greatly improve the ecological integrity of the entire refuge and enhance migratory bird populations.
3. Relatively large parcels of land could be naturally restored to tidal marsh at little cost. Such action would greatly enhance the ecological integrity of the entire refuge and all of San Francisco Bay.
4. Survival prospects for endangered and threatened species would be greatly enhanced, since they and their habitat would be protected and managed in perpetuity.
5. Additional lands in refuge status could offer many new opportunities for enjoyment by people.
6. Refuge status would assure protection of historic and archaeological features by law and refuge policy.
7. Additions to the refuge could constrain transportation projects such as highways, bridges, rail lines, etc., inasmuch as such uses on refuge lands could have detrimental impacts on the fulfillment of refuge objectives. However, the Service recognizes the need for bay area transportation,

water pollution control plants, etc. Water discharges meeting the water quality criteria set by the State and Regional Water Quality Control Boards are currently accepted by the refuge. Expansion of the refuge does not preclude access to current utility projects, nor the completion or initiation of transportation and utility projects. Based on current information, it appears that Alameda County Water District's Salinity Barrier Project would be compatible with proposed refuge expansion, and could provide substantial benefits to the refuge in the form of additional salt marsh habitat.

8. The proposal could contribute toward improving water quality in the bay by 1) restoring and enhancing both freshwater and salt marshes, which are natural water purifiers; and 2) precluding non-point source pollution from some developments on a few of the parcels of land that would be added to the refuge.
9. The indirect effects of residential and industrial development that could be precluded by refuge land acquisition could adversely impact supply, service, and labor segments of the economy. It is impossible to predict the extent of economic impact the Service's land acquisition plans may have for three reasons.
 - a. The effect is an indirect one over time considering the context of the entire south bay planning and development scheme. It is the counties and cities which have the authority to ultimately control growth within the south bay area.
 - b. The Service cannot predict which properties will become available for acquisition and when they may become available.
 - c. The majority of lands considered suitable for inclusion in the refuge are wetlands. It is impossible to predict how many properties will be granted permits for development in these wetlands. Specific economic impacts will be analyzed as a part of the development permit processes.

In light of the fact that many of the potential acquisitions have wetland characteristics, it is highly questionable that these parcels could be developed to a higher use. Therefore, the Service believes that, overall, the negative indirect impact upon residential and industrial development will not be significant.

The indirect adverse economic impact noted above would be partially offset by the following:

- a. The value of preserving wildlife habitat or wildlands for enjoyment by the public cannot be compared with land development in terms of dollar values. The economic values of development may not exceed the inherent long-term benefits of preserving wildlife habitat (Council on Environmental Quality, 1978).
 - b. Revenues could be generated by more people, both locals and tourists, that use the refuge. More tourists to the area would require more services such as transportation, food, and lodging.
 - c. Additional Federal spending for refuge development, management, services, and supplies would have additional beneficial economic impacts on the local economy.
 - d. As discussed earlier in this report, county property tax revenues lost due to Service acquisition would be offset by annual payments to the counties in accordance with the Refuge Revenue Sharing Act.
10. Air quality of the bay area would probably be enhanced. Refuge status would protect existing vegetation and encourage growth of new marsh vegetation in the area and thus contribute to atmospheric stability. Air cleansing qualities of plants are well documented (Mitsch and Gosselink, 1986; Office of Technology Assessment, 1984).

B. No Action Alternative

1. If no action is taken to acquire and preserve, enhance, and/or restore important wildlife, many species of wildlife, including several endangered and threatened species, may be lost.
2. Industrial and residential development will probably occur on some of the lands considered for refuge expansion.
3. Additional opportunities for public enjoyment of wildlife-oriented activities would not be provided.
4. Archaeological resources could be destroyed.
5. The quality of air and water could be detrimentally affected, and aesthetic qualities could be lowered.
6. No additional long-term Federal commitments for protection of wildlife resources would be made.

C. Fee Title Acquisition Alternative

1. The impacts of this alternative are similar to the impacts of the preferred alternative except fee title purchase of lands would be the only method of acquisition used.
2. This alternative could provide more benefits for wildlife (including endangered species), and more public use opportunities, than the preferred alternative because there would be more flexibility for management of the habitat if it were all owned in fee. However, if acquisition by easement and cooperative agreements is precluded, it is likely that less habitat would be preserved and therefore fewer benefits derived.
3. The cost to implement this alternative would be greater than for the preferred alternative.
4. Refuge Revenue Sharing Act payments would be made on all properties purchased in the affected counties.
5. The original legislation establishing the refuge (Public Law 92-330), states in part, ". . . lands, waters, and interests therein owned by the State of California or any political subdivision thereof may be acquired only by donation." This alternative would not allow the Service to accept donations from the State, counties, or cities.

D. Conservation Easement Acquisition Alternative

1. The impacts of this alternative would be limited because the landowner would retain ownership and maintain the status quo of the land by agreeing not to develop it. The issues related to trespass, hunting opportunities, water rights, etc. would continue to be the responsibility of the land owner.
2. No land would be removed from the tax roles, so no payments to any of the counties under the Refuge Revenue Sharing Act would be required.
3. If all easements acquired were restrictive enough (and allowed for wetland enhancement), refuge objectives could be accomplished. However, the cost to acquire such restrictive easements could nearly equal the cost of fee title, and the Service would not have as much management flexibility and potential wildlife benefits as in the proposed action.

E. Acquisition/Management by Others Alternative

1. If the proposed refuge additions were acquired and managed by another agency, organization, or individual in a manner

that would accomplish Service objectives, the wildlife resources could be preserved and this alternative could be viable.

2. This alternative would require long-term commitments of land, water, human, and monetary resources for protection of the wildlife resources.
3. Land could be taken from the tax roles depending upon which entity acquired it.
4. Cultural, social, and economic resources could be adversely impacted depending upon the philosophy and management style of those in control.

F. Other Alternatives

None of the other alternatives that were considered are likely to become comprehensive, effective solutions for the problem of preserving wildlife and wildlife habitat in south San Francisco Bay.

In summary, acquisition of wetlands, uplands, and other habitat types as described in this proposal could have detrimental impacts on proposed development projects such as subdivisions for housing developments and industrial and commercial complexes. However, in the opinion of the Service and the great majority of those individuals and groups commenting on the proposal as a result of public meetings, these adverse impacts would not be significant within the context of the entire San Francisco Bay ecosystem, the Pacific Flyway, and the resulting public use and benefits. Table 3 summarizes anticipated effects of the alternatives.

Table 3. Alternative Matrix - Effects of Alternatives

<u>Resource</u>	<u>Alternative</u>				
	Fee, Easement, Lease, Agreement	No Action	Total Fee	Total Easement	Acquisition/ Management by Others
Wetlands	Preserve Most	Preserve None	Preserve All	Preserve Most	Preserve Some
Uplands	Preserve Some	Preserve None	Preserve Some	Preserve Little	Preserve Some
Riparian Habitat	Preserve Most	Preserve None	Preserve Some	Preserve Some	Preserve Some
Endangered/ Threatened Species	Enhance Survival	No Benefit	Enhance Survival	Enhance Survival	Enhance Survival
Migratory Birds	Support All	Support Few	Support All	Support Most	Support Some
Other Wildlife	Support All	Support Few	Support Most	Support Most	Support Some
Fish & Shellfish	Support All	Support Few	Support Most	Support Most	Support Some
Archaeology/ Historical	Preserve Most	Preserve None	Preserve Most	Preserve Some	Preserve Some
Public Recreation	Provide Much	Provide None	Provide Much	Provide Little	Provide Some
Economic Impact	Some	None	Some	Some	Some

V. STATEMENT OF COMPLIANCE

Since the proposal is to preserve wetlands within the coastal zone and within a floodplain, the Service believes that the recommended action is in accordance with Executive Order 11988, Floodplain Management; Executive Order 11990, Protection of Wetlands; and Public Law 92-583, Coastal Zone Management Act. The proposal is also consistent with the San Francisco Bay Conservation and Development Commission's San Francisco Bay Plan. The proposal is consistent with Executive Order 12630, which concerns "Government Actions and Interference With Constitutionally Protected Property Rights", because, with the exception of donations and exchanges, the Service will be paying fair market value for real property interests it acquires. An Internal Section 7 Evaluation and Consultation was completed to comply with Public Law 93-205, Endangered Species Act; and an archaeological records search was completed to comply with Executive Order 11593, National Historic Preservation Act. Following acquisition, the National Historic Preservation Act of 1966, as amended, and refuge policy will assure protection of all sites of significant importance. The issue of management plans and a consistency determination will also be addressed following acquisition. The intergovernmental review process was initiated to comply with Executive Order 12372, Intergovernmental Review of Federal Programs. Acquisition of land would be in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act (Public Law 91-646). Contaminant surveys will be completed as appropriate throughout the acquisition process to comply with Secretarial Order 3127.

VI. CONSULTATION AND COORDINATION IN DEVELOPMENT OF THE PROPOSAL AND IN PREPARATION OF THIS ASSESSMENT

This proposal to acquire land to add to the existing San Francisco Bay National Wildlife Refuge has been discussed with a large number of landowners; conservation organizations; Federal, State, County, City, and other local entities; and interested individuals. The purpose of this consultation was to inform and coordinate with all potentially affected interests early in the planning process to identify effects of the proposal and evaluate practical alternatives. Personal contacts, news releases, and "open houses" (public meetings) were techniques used to solicit public involvement. Public hearings were conducted in conjunction with the legislation. Landowners within the project proposal were contacted in person when possible and practical. Others were contacted by mail and/or phone. Unfortunately, due to problems with tract identification, NASA was not contacted prior to publication of the draft environmental assessment. To rectify this oversight, Service personnel met with NASA officials to discuss their concerns. Input and comments were received from many people during both the early planning stages and the review process.

One of the major reasons that legislation was passed to increase the size of the refuge was the tremendous public support. A total of 137 letters commenting on the draft environmental assessment were received. Several organizations in support of the refuge expansion noted the thousands of individuals they represented. For example, the Citizens Committee to Complete the Refuge claimed to represent 150,000 members, the Palo Alto chapter of the Sierra Club - 23,000+ members, Sequoia Audubon Society - 3,200 members, and the Napa-Solano Audubon Society - 800 members.

Only 13 letters, representing 10 entities (1 city, 7 landowners, the Bay Coalition, and 1 interested development corporation that does not own land within the project) expressed opposition to the refuge expansion as presented in the draft environmental assessment. Although no mention was made in the letter of the size of its constituency, the Bay Coalition obviously represents a large number of people. In all cases, opposing comments pertained only to certain parcels, rather than to the concept of expanding the refuge, per se. Numerous comments and suggestions for improving the quality and accuracy of the draft assessment were received. All comments were given serious consideration in the overall analysis of responses and in the preparation of this final environmental assessment. All responses were appreciated.

It is anticipated that approximately 1,000 copies of this final environmental assessment will be sent to Federal and State Congressional delegations, State and local agencies, landowners, interested individuals, and private groups. It is also available in several public libraries, at San Francisco Bay National Wildlife Refuge headquarters in Fremont, California, and at the Service's regional office in Portland, Oregon.

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APPENDIX A



Public Law 92-330
92nd Congress, H. R. 12143
June 30, 1972

An Act

86 STAT. 399

To provide for the establishment of the San Francisco Bay National Wildlife Refuge.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, for the preservation and enhancement of highly significant wildlife habitat in the area known as south San Francisco Bay in the State of California, for the protection of migratory waterfowl and other wildlife, including species known to be threatened with extinction, and to provide an opportunity for wildlife-oriented recreation and nature study within the open space so preserved, the Secretary of the Interior (hereinafter referred to as the "Secretary") is authorized and directed to establish, as herein provided, a national wildlife refuge to be known as the San Francisco Bay National Wildlife Refuge (hereinafter referred to as the "refuge").

San Francisco
National Wildlife
Refuge
Establishment.

SEC. 2. There shall be included within the boundaries of the refuge those lands, marshes, tidal flats, salt ponds, submerged lands, and open waters in the south San Francisco Bay area generally depicted on the map entitled "Boundary Map, Proposed San Francisco Bay National Wildlife Refuge", dated July 1971, and which comprise approximately twenty-one thousand six hundred and sixty-two acres within four distinct units to be known as Fremont (five thousand five hundred and twenty acres), Mowry Slough (seven thousand one hundred and seventy-five acres), Alviso (three thousand and eighty acres), and Greco Island (five thousand eight hundred and eighty-seven acres). Said boundary map shall be on file and available for public inspection in the offices of the Bureau of Sport Fisheries and Wildlife, Department of the Interior.

Description.

SEC. 3. (a) The Secretary shall establish the refuge by publication of a notice to that effect in the Federal Register at such time as he determines that lands, waters, and interests therein sufficient to constitute an efficiently administrable refuge have been acquired for administration in accordance with the purposes of this Act. The Secretary may from time to time make corrections in the boundaries of the refuge, but the total area within the boundaries shall not exceed twenty-three thousand acres of land, marshes, tidal flats, salt ponds, submerged lands, and open waters.

Publication in
Federal Register.

(b) Prior to the establishment of the refuge and thereafter, the Secretary shall administer the lands, waters, and interests therein acquired for the refuge in accordance with the provisions of the National Wildlife Refuge System Administration Act of 1966, as amended (80 Stat. 927; 16 U.S.C. 668dd-668ee); except that the Secretary may utilize such additional statutory authority as may be available to him for the conservation and management of wildlife and natural resources, the development of outdoor recreation opportunities, and interpretive education as he deems appropriate to carry out the purposes of this Act.

Administration.

SEC. 4. The Secretary may acquire lands and waters or interests therein within the boundaries of the refuge by donation, purchase with donated or appropriated funds, or exchange: *Provided, however,* That lands, waters, and interests therein owned by the State of California or any political subdivision thereof may be acquired only by donation.

82 Stat. 359;
83 Stat. 283.

Lands, waters,
acquisition.

APPENDIX A

Pub. Law 92-330

- 2 -

June 30, 1972

26 STAT. 400

Appropriation,
limitation.

SEC. 5. There are authorized to be appropriated such sums as may be necessary to carry out the provisions of this Act for the period beginning July 1, 1972, and ending June 30, 1977, not to exceed, however, \$9,000,000 for the acquisition of lands and interests therein as authorized by section 4 of this Act, and not to exceed \$11,300,000 for the carrying out of the other provisions of this Act.

Approved June 30, 1972.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 92-813 (Comm. on Merchant Marine and Fisheries).

SENATE REPORT No. 92-859 (Comm. on Commerce).

CONGRESSIONAL RECORD, Vol 118 (1972):

Feb. 7, considered and passed House.

June 16, considered and passed Senate.

WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Vol. 8, No. 27:

July 1, Presidential statement.

PUBLIC LAW 100-556—OCT. 28, 1988

102 STAT 2779

Public Law 100-556
100th Congress

An Act

To require that plastic ring carrier devices be degradable, and for other purposes.

Oct. 28, 1988
[S. 1986]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

**TITLE I—DEGRADABLE PLASTIC RING
CARRIERS**

SEC. 101. FINDINGS.

42 USC 6914b
note.

The Congress finds that—

- (1) plastic ring carrier devices have been found in large quantities in the marine environment;
- (2) fish and wildlife have been known to have become entangled in plastic ring carriers;
- (3) nondegradable plastic ring carrier devices can remain intact in the marine environment for decades, posing a threat to fish and wildlife; and
- (4) 16 States have enacted laws requiring that plastic ring carrier devices be made from degradable material in order to reduce litter and to protect fish and wildlife.

SEC. 102. DEFINITIONS.

42 USC 6914b.

As used in this title—

- (1) the term "regulated item" means any plastic ring carrier device that contains at least one hole greater than $1\frac{3}{4}$ inches in diameter which is made, used, or designed for the purpose of packaging, transporting, or carrying multipackaged cans or bottles, and which is of a size, shape, design, or type capable, when discarded, of becoming entangled with fish or wildlife; and
- (2) the term "naturally degradable material" means a material which, when discarded, will be reduced to environmentally benign subunits under the action of normal environmental forces, such as, among others, biological decomposition, photodegradation, or hydrolysis.

SEC. 103. REGULATION.

42 USC 6914b-1.

Not later than 24 months after the date of the enactment of this title (unless the Administrator of the Environmental Protection Agency determines that it is not feasible or that the byproducts of degradable regulated items present a greater threat to the environment than nondegradable regulated items), the Administrator of the Environmental Protection Agency shall require, by regulation, that any regulated item intended for use in the United States shall be made of naturally degradable material which, when discarded, decomposes within a period established by such regulation. The period within which decomposition must occur after being discarded shall be the shortest period of time consistent with the intended use

of the item and the physical integrity required for such use. Such regulation shall allow a reasonable time for affected parties to come into compliance, including the use of existing inventories.

TITLE II—SAN FRANCISCO BAY NATIONAL WILDLIFE REFUGE

SEC. 201. ENLARGEMENT OF REFUGE.

Section 2 of the Act entitled "An Act to provide for the establishment of the San Francisco Bay National Wildlife Refuge", approved June 30, 1972 (16 U.S.C. 668dd note), is amended to read as follows:

"Sec. 2. There shall be included within the boundaries of the refuge the following:

"(1) Those lands, marshes, tidal flats, salt ponds, submerged lands, and open waters in the south San Francisco Bay area generally depicted on the map entitled 'Boundary Map, Proposed San Francisco Bay National Wildlife Refuge', dated July 1971, and which comprise approximately twenty-one thousand six hundred and sixty-two acres within four distinct units to be known as Fremont (five thousand five hundred and twenty acres), Mowry Slough (seven thousand one hundred and seventy-five acres), Alviso (three thousand and eighty acres), and Greco Island (five thousand eight hundred and eighty seven acres). Said boundary map shall be on file and available for public inspection in the offices of the United States Fish and Wildlife Service, Department of the Interior.

"(2) Up to 20,000 acres in the vicinity of the areas described in paragraph (1), and similar to the areas described in paragraph (1), which the Secretary determines are necessary to protect fish and wildlife resources."

Public
information.

Fish and fishing.

SEC. 202. TOTAL AREA OF REFUGE.

16 USC 668dd
note.

Subsection (a) of section 3 of such Act is amended in the second sentence by striking "twenty-three thousand acres" and inserting "43,000 acres".

SEC. 203. AUTHORIZATION OF APPROPRIATIONS.

16 USC 668dd
note.

Section 5 of such Act is amended—

- (1) by inserting "(a)" before "There"; and
- (2) by adding at the end the following new subsection:

"(b) There are authorized to be appropriated to the Secretary to acquire areas described in section 2(2) such sums as may be necessary, which shall remain available until expended."

Approved October 28, 1988.

LEGISLATIVE HISTORY—S. 1986 (H.R. 940) (H.R. 5117):

HOUSE REPORTS: No. 100-360, Pt. 1, accompanying H.R. 940 (Comm. on Merchant Marine and Fisheries) and No. 100-946, Pt. 2, accompanying H.R. 5117 (Comm. on Energy and Commerce).

SENATE REPORTS: No. 100-270 (Comm. on Environment and Public Works) and No. 100-266 accompanying H.R. 940 (Comm. on Commerce, Science, and Transportation).

CONGRESSIONAL RECORD:

Vol. 133 (1987): Oct. 13, H.R. 940 considered and passed House.

Vol. 134 (1988): May 13, S. 1986 considered and passed Senate.

Oct. 4, considered and passed House, amended, in lieu of H.R. 5117.

Oct. 14, Senate concurred in House amendments.

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